Marine fisheries not fully tapped

P.S.B.R. JAMES, Director, Central Marine Fisheries Research Institute, Kochi, calls for joint ventures with countries having expertise and experience in high sea fishing for tapping the vast offshore and deep sea fishery resources.

MARINE fisheries resources of India are rich and varied and supported by many species and exploited by various combinations of fishing craft and gear. Exploitation of these resources is mostly confined to the coastal belt in the 0-50 metre depth zone.

While mechanisation of small boats and innovations such as installation of outboard motors to traditional craft, ring seines and small pelagic trawls, have steadily increased production from this zone since the early Sixties, there are signs of stagnation in production from the coastal fisheries. Industrial type of fishing is mostly carried out off the north-east coast by a hundred and odd large trawlers. The demand for shrimp and other resources in the export market has steadily increased simultaneously with the demand for fish in the domestic market.

Intensive exploitation of the resources in the narrow coastal belt by the mechanised and non-mechanised sectors has resulted in conflict between these two sectors, compelling certain States to enforce legislation such as ban on trawling in the monsoon season and the Marine Fishing Regulation Act, for sustaining production and managing the resources. In this context, it becomes necessary to examine the present production, potential resources and ways of increasing production.

Decline in growth rate

The coastal fisheries limited up to a depth of 50m are mainly exploited by indigenous craft, boats fitted with outboard and inboard motors and small mechanised vessels using trawls, purse seines, drift gill nets, dol nets, hooks and lines. The average rate of growth of marine fish production during 1961-65, 1966-70, 1971-75, 1976-80, 1981-85 and 1986-90 was 26.6, 28.9, 10.9, 12.9 and 23.4 per cent respectively. The maximum growth rate of 28.9 per cent between 1966-70 and 1971-75 may be attributed to intensification of mechanisation. But the growth rate declined in the later years in spite of introduction of purse seines, motorisation of indigenous craft and overall increase in the effort. The reasons include lack of efforts to diversify the fishing effort in the 0-50 m depth zone as well as to tap the vast potential of the EEZ.

Marine fish production increased to 1.66, 1.80 and 2.25 million tonnes in 1987, 1988 and 1989 respectively. During 1989 the non-mechanised sector accounted for 353,000 tonnes (16 per cent), the mechanised (propulsion) sector 785,000 tonnes (36 per cent) and mechanised sector 1046,000 tonnes (48 per cent) of the total catches. The region-wise annual production (average for the years 1987-89) and the potential in different depths are indicated in Table I.

During the period 1980-88, the major contribution to marine fish production was by oil sardines (10 per cent), prawns (eight per cent), Bombay duck (6.4 per cent), sciaenids (6.4 per cent), anchovies (5.3 per cent), lesser sardines (4.5 per cent), silver bellies (4.4 per cent), carangids (4.4 per cent), perches (4.2 per cent) and ribbon fishes (4.1 per cent). The contribution of other species/groups was less than four per cent. In 1989 marine fish catches were mainly of oil sardines, Bombay duck, carangids, mackerel, tunas, perches and shrimps.

The State-wise catch and average catch for 1987, 1988 and 1989 are given in Table II.

Fished at optimum level

An analysis of the current situation in coastal fishing indicates that the coastal area has been more or less fished at the optimum level. While about 25 per cent of the active fishermen are engaged in mechanised fishing, accounting for about 60 per cent of the catch, the rest of the fishermen (75 per cent), engaged in traditional fishing, contribute only 40 per cent of the catch. For development of the traditional sector, there should be continuous monitoring of the catches landed at different parts of the coast, better understanding between the States for exploiting their resources, control on the introduction of additional small mechanised boats, regulation of the mechanisation of indigenous craft and development of the domestic marketing system for obtaining better prices.

Various estimates of the potential of the exclusive economic zone (EEZ) have been made and they range from 2.5 million tonnes to 5,5 million tonnes based on

I: Annual potential yield and average production (1987-89) of marine fish (EEZ of India)

Region	Average production	Annual potential yield			Total
		0-50m	50-200m	Over 200m	
	(in thousand tonnes)				
North-west region (Gujarat & Maharashtra)	578	540	340		880
South-west region (Goa, Karnataka & Kerala)	793	700	720		1420
South-east region (Tamil Nadu, Pondicherry & Andhra Pradesh)	444	480	200		680
North-east region (Orissa & West Bengal)	74	540	200		740
Lakshadweep region	7		90		90
Andaman & Nicobar region	10		160		160
Oceanic of all regions	—			500	500
Total	1906	2260	1710	500	4470

exploratory surveys, productivity studies and monitoring of catches from exploited fisheries. The pelagic resources of the country are expected to yield about 1.8 million tonnes. Important resources which can contribute to this production include white bait. carangids, ribbon fishes and small tunas. The ground fish resources are estimated to have a potential of 1.1 million tonnes. The groups of fish, which contribute to this resource include cat fishes, carangids, sciaenids, perches, threadfin breams, lizard fishes and barracudas. The crustacean resources mainly include deep water shrimps and lobsters, having a potential of about 12,000 tonnes. The squids and cuttle fishes are at present underexploited. The zone between 50 to 200m seems to be a good ground for this resource. The potential of unexploited non-conventional deepsea resources has been estimated at 18,146 tonnes. These resources include myctophids, bull's eye, Indian drift fish, black ruff, green eye and rat tail.

Offshore ground fish resources

It is now known that the trawlable offshore ground fish resources are restricted to the outer shelf and slope as well as to certain restricted areas such as Quilon bank and the Wadge bank. The species caught are mainly percoid fishes, several meso and bathy pelagic fishes as well as deepsea prawns and lobsters. Beyond the continental slope there is virtually no evidence of availability of commercially important ground fish. Sciaenids, lutianids and lethrinids form a significant component of the underexploited ground fish resources. Good catch rates of these fishes were obtained in the 50 to 200m depth in the Wadge bank and the Gulf of Mannar areas and within 50 to 150m of the north-west coast. The Kalava *(Epinephelus)* ground of the rocky outcrops of the south-west coast is well known for line and trap fishing. The pink perch is the dominant species in the 100 to 200m depths along the west coast and the Wadge bank and the Gulf of Mannar areas. Carangids, horse mackerel and scads have been found in large quantities between 50 to 100m depths along the west coast and the lower east coast.

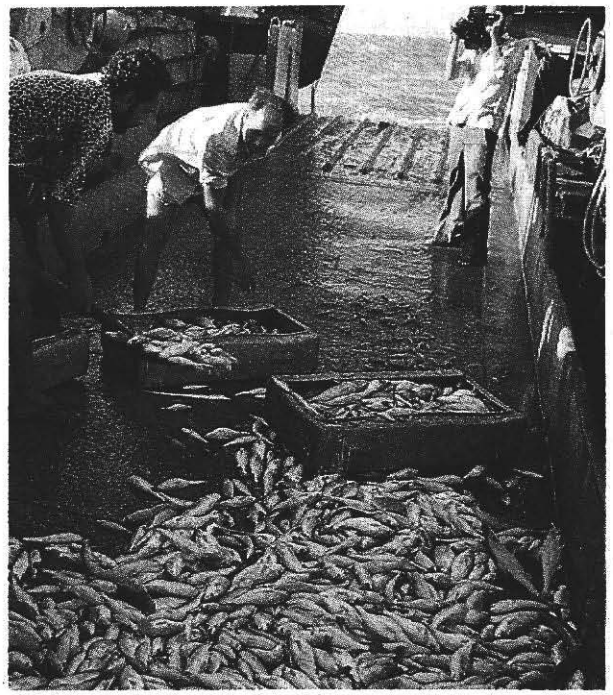
The seasonal availability of significant quantities of cat fishes on the mid shelf along the south west-coast was recorded. Likewise, good catches of cat fish were recorded from 50 to 100m depth zone along the upper east coast.

The deep sea lobster and a few species of penaeid and non-penaeid deep sea prawns from the shelf slopes of the west coast in depths ranging from 150 to 400m are significant resources amenable to commercial exploitation.

II: Statewise marine fish landings in 1987-89

	1987	1988	1989	Average (tonnes)
West Bengal	22741	12017	36778	23845
Orissa	55758	46562	47034	49785
Andhra Pradesh	139160	123560	122775	128498
Tamil Nadu	303630	295664	309660	302985
Pondicherry	13456	13004	12360	12940
Kerala	303286	468807	647526	473206
Karnataka	220576	212409	251012	227999
Goa	65677	91168	119866	92237
Maharashtra	285202	315244	362330	320925
Gujarat	236900	207363	327264	257176
Andamans	8865	11210	11210*	10429*
Lakshadweep	7299	6809	6809*	6972*
Total	1662550	1803817	2254624	1906997

* Provisional



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Fish being sorted out by the crew in a fishing vessel in the Arabian sea. Deepsea fish catches include several new and hitherto unexploited species.

Of the oceanic pelagic fishes, the larger tunas, bill fishes and sharks are the main components. The potential yield estimates of tunas and allied species from the Indian Ocean are between 0.51 and 0.79 million tonnes. However, the average catch has been around 0.2 million tonnes. Up to 200m depth in the EEZ, a potential of 240,000 tonnes of tunas and allied fishes was estimated. The main oceanic species concerned are the yellow fin, big eye and the albacore. India has virtually no share of the commercial catches of these species from the Indian Ocean except perhaps the marginal exploitation of the young yellowfin stock touching the Lakshadweep archipelago. Exploratory long lining has indicated high hooking rates of larger oceanic tunas and pelagic sharks from the EEZ. Yellowfin tuna is the dominant species in these catches from the seas around India whereas the big eye tuna was more abundant in the equatorial waters and the albacore was confined to the Andaman and Nicobar region. It is interesting to note that skipjack tuna was more frequently hooked from the east coast.

Another major commercial resource of high value from the offshore waters is that of cephalopods. Recent surveys indicate this group as forming about four per cent of the demersal catch from the west coast and 0.6 per cent from the east coast with good concentrations in the 50 to 100m depth of the north-west coast and the Wadge bank and the Gulf of Mannar areas. A potential yield of 18 lakh tonnes is indicated for this resource from the sea around India of which about 55,516 tonnes are currently caught.

Qualitatively offshore resources can be divided into three types. The first, the underexploited resources

III: Major resources for increased production

Species/Group	Present* Yield	Potential Yield	Area	Depth (metres)	Method of Capture
		(thousand tonnes)			
Anchovies	130	240	S.W. coast Gulf of Mannar	20-50	Small purse seines Midwater trawls
Carangids	114	265	Gujarat coast N.E. coast	0-50 & 50-125	Purse seines, Drift gillnets
Ribbon fishes	72	270	S.W., S.E. & N.W. coasts	20-50, 50-80	Improvised boat-seines & trawl
Tunas and allied fishes (from the 0-200m area)	42	240	A & N waters Laskshadweep sea along mainland coast	>100 >100 >50	Purse seines, Long lining and improvised drift gill nets
Cat fishes	53	310	N.E., N.W. & S.W. coasts	20-50 & 50-100 >100	Bottom fish trawl drift gillnet
Perches	95	250	S.W. coast, Wadge bank, N.E. coasts	0-50 & 75-225	Fish trawl, handline, traps
Deepsea prawns and lobsters (southwest coast)	—	11	S.W. coast Gulf of Mannar	300-400 180-270	Large shrimp trawl
Cephalopods	43	180	N.W. S.W. & S.E. coast	0-50 50-200	Squid jigging, fish trawl
Deepsea non conventional resources (Southwest coast)	—	22	S.W. & E coast	200-500	Bottom fish trawls

* Average for 1987-89

such as those of horse mackerels, white bait, cat fish, ribbon fish, threadfin breams and perches. These are conventional types of food fishes which can be easily marketed internally. The second includes the deepsea lobster, deepsea prawns, squids, cuttle fish and oceanic tunas, which have an export potential. The third includes the ground fishes of an unconventional nature which require to be processed and popularised to attract either internal or export market.

Table III gives details of some important resources, their current yields, potential yields, areas and depths of availability and suitable methods of capture. The various States and Union Territories should make use of the information of the types and plan their strategies to exploit them in a phased manner in the inshore, offshore and deepsea regions.

Deepsea fishing can be economical if good prices are assured. Non-availability of ready markets for the resources available in the deepsea areas has been a serious constraint. In the oceanic waters, resources such as tunas, squids and cuttle fishes and sharks are the least exploited. Heavy investment in terms of vessels, manpower and other infrastructure is needed. Under the large-scale commercial fishery sector, augmentation of production of tunas can be achieved by proper deployment and management of oceanic purse-seiners and improvements in the long line fishery. Successful surface fishery for tunas can be achieved by purse seine operations through joint ventures and the potential of squids and cuttle fishes in the oceanic areas could be exploited if direct methods such as squid jigging are introduced.

Unexploited species

Deepsea fish catches include several new and hitherto unexploited species. Chemical composition and nutritional value decide the edibility of fish on which depends their exploitation. The amino acid levels and proximate composition of these fishes were found to be generally similar to other marine fishes. The protein of these fishes are comparable to milk protein in growth promotion. The protein content varied from 11 to 24 per cent and fat 0.3 to 17.6 per cent for some of the species. Frozen shelf life varied from eight to 19 months. Different species were processed through freezing, canning, preparation of minced meat and meat-based products, including fish wafers and cutlets, fish patties and breaded fish stocks, texturised meat, fish soup powder and other byproducts including fish meal and fish sauce. This information indicates that the offshore and deepsea fisheries resources which are at present not commercially exploited are nutritionally valuable and can be converted into a variety of products for human consumption and other uses.

Export potential

Export of marine products has shown a steady increase in volume and value for the past five years. The total quantity exported in 1989-90 was 1,10,788 tonnes, valued at Rs. 634.76 crores. Diversification of markets and products has helped to achieve significant results. Recent export indicate the potential in items other than shrimp. Frozen shrimp, fresh frozen fish, frozen cuttle fish and frozen squid were the most important items exported in 1989.

Joint ventures with countries having expertise and experience in high sea fishing appear to be ideal. The policy of chartering vessels should continue for exploiting all types of resources not exploited hitherto at the optimum level. Market promotion should get top priority as some of the fishes do not get a good export price, but can be disposed of in the local markets.

In order to attract investment in the deepsea fishing industry for exploiting the non-shrimp resources of the EEZ and beyond, steps are being taken for speedy clearance of the projects, acquiring vessels on lease by joint ventures, allowing joint venture partners to limited periods of test fishing to assess the availability of resources, suitability of the vessels and adaptability of foreign nationals to fishing in the tropical conditions.

Steps are also contemplated to compensate the Indian deepsea fishing vessels engaged in export production, by meeting a portion of the cost of high-speed diesel oil actually consumed by them for fishing efforts to certain limits based on their export performance.